Math In Real Life

An Honors Thesis (HONRS 499)

by

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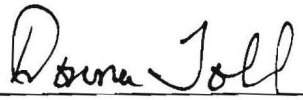

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Abstract

Mathematics is a subject that many young students find difficult and not enjoyable. Many students cannot see how they will ever use the concepts they learn in math in their lives. In order for students to engage in lessons, the teacher must motivate them. It is the teacher's job to design lessons that interest the students and engage them in meaningful activities. One way to make lessons meaningful is by designing them around real-life application. Every concept can be adapted to real-life application, and teachers should encourage students to make these connections. I wrote a 20- lesson unit plan that contains four lessons for each content standard (Number Sense, Computation, Algebra and Functions, Geometry, and Measurement), in which each lesson is completely designed around a real-life application. A majority of the lessons are original ideas.

Acknowledgements

I would like to thank Mrs. Donna Toll for advising me though this project. She is a wonderful teacher with a wide variety of ideas, and unbelievable knowledge of math teaching strategies and content. This honors project is just one small aspect of all that she has helped me with in my four years at Ball State University. She encouraged me to concentrate in mathematics, and I have become a better teacher thanks to her.

Author's Statement

One of the most difficult, but most important, parts of lesson planning is motivating the students. Students want to learn skills and concepts that will be useful to them. If they cannot apply what they are learning to their own lives, they will lack motivation and this will affect their comprehension and mastery of the skill. One way to motivate students is to create themed lessons that show a real-life application from beginning to end. My concentration area is mathematics and I find this to be a difficult subject for most students. I created a unit plan that teaches lessons covering at least four sub-standards for the five Indiana content standards. I researched standards for third, fourth, and fifth grade, so that I could include differentiated learning as well as make accommodations for students who need them. Through my own teaching experiences, I have found that students get excited about learning when lessons are based around a real-life application of the skill. I have seen teachers provide students with worksheet after worksheet, and although this may work for some, learning through hands-on, authentic activities will create better success for the students, especially for students who are not visual learners. This unit is designed to cover necessary fourth grade skills needed to advance in mathematics education. This unit would not necessarily be taught consecutively in the order that it appears. It is organized by standard in the following order:
Standard 1: Number Theory, Standard 2: Computation, Standard 3: Algebra and Functions, Standard 4: Geometry, and Standard 5: Measurement.
This unit is intended to be a resource for teachers who find difficulty motivating students in math, or find difficulty relating math skills and concepts to the real world.

Katie Atkins
4th Grade Level
Lesson Plan- Rounding Whole Numbers

Real Life Application: Rounding whole numbers in a bank setting.

Indiana Standards Reference: Standard 1, Number Sense:
Students understand the place value of whole numbers and decimals to two decimal places and how whole numbers and decimals relate to simple fractions.

4.1.3 Round whole numbers up to 10,000 to the nearest ten, hundred, and thousand.

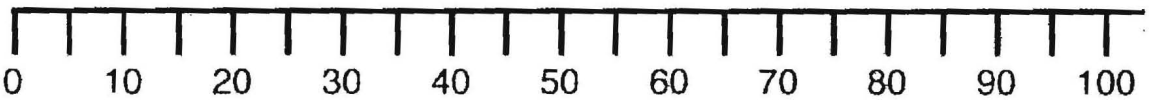
Objectives: The students will round whole numbers to the nearest ten, hundred, or thousand using the rules for rounding.

Entry Behavior:
3.1.6 Round numbers less than 1,000 to the nearest ten and the nearest hundred.

Materials List: computers, number lines (tens, hundreds, thousands), white boards/notebook paper, bank account worksheet, strips of paper containing instructions, bowl

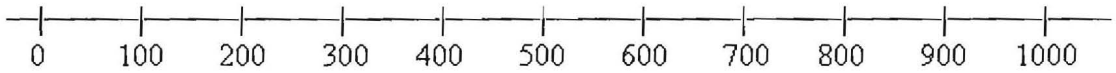
Engagement: The students will get on the computer and visit the site http://www.handsonbanking.org/HOB_kids_en.html. They will listen to the introduction. They will then explore the site on their own learning about banking, credit, and saving. This will introduce the real life theme into the lesson, and get the children excited about the exploration section. If computers aren't available for each student, the teacher can project the site and explore it together with the class.

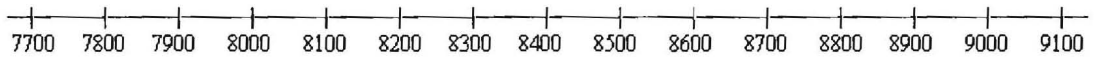
Exploration: The teacher will start by reviewing addition and subtraction of two and three digit numbers, making sure the students know the method of carrying and borrowing. The teacher will ask: What do we do next? What is this called? When the students prove to have this concept mastered the teacher will introduce the concept of rounding. The students will receive a number line that shows the numbers up to 100 counting by tens. This number line represents $100 that is in your bank account.



The teacher will ask the students to mark a number on the number line. For example John spent $42. The students will mark 42. They will look at where they have placed this mark and answer the question, is 42 closer to 40 or 50? Explain how you know this. The teacher will repeat this process using other examples (86, 21, 99, etc). The teacher will then provide the students with the rules of rounding. She will have the students help her

write the rules on the board using what they discovered during the number line activity. The rules will be similar to:
Tens
If the digit in the ones place is less than 5 the number will be rounded down.
If the digit in the ones place is 5 or greater, the number will be rounded up.
The teacher may have to assist the students when discussing the digit being 5 in the ones place, because this may be a problem area for some students considering that 5 is exactly halfway between 0 and 10 (or 25 is halfway between 20 and 30, etc). This entire process will be repeated using number lines for hundreds and thousands.
The students will practice problems such as:
Steven has $44 in his bank account. He puts $22 more dollars in his account? Use rounding to find out approximately how much Steven has in his account.
Anna has $1,274 in her savings account. She needs to include an estimate of this amount on a credit-card application. How would she round this amount to the nearest thousand?





The students and teacher will work together to create the rules for rounding to the nearest hundred and thousands. The rules will be similar to:
Hundreds:
If the tens digit is 0, 1, 2, 3, or 4, then the hundreds digit does not change. You are rounding down.
If the tens digit is 5, 6, 7, 8, or 9, then the hundreds digit increases by one. You are rounding up.
All the other digits after the hundreds digit (tens digit and ones digit) go to zero in both cases.
Thousands:
If the hundreds digit is 0, 1, 2, 3, or 4, then round down.
If the hundreds digit is 5, 6, 7, 8, or 9, then round up.
When you round down, the thousands digit doesn't change, and the hundreds, tens, and ones digits go to zero.
When you round up, then thousands digit increases by one, and the hundreds, tens, and ones digits go to zero.
When might you round whole numbers? Possible answers may be when you are measuring something, construction, or shopping.

Explanation: The students will be helping the teacher write rules for each of the rounding scenarios. They will be explaining why they came up with the rule and how it

works. The teacher will be assisting the students in creating a formal rule that works for every scenario.

Evaluation: The students will be given a bank account. They will draw strips out of a bowl with instructions on them. These will include things such as:
You mowed Grandma's lawn and earned $25 for your bank account. (Round this number to the nearest ten)
You bought a new video game for $34. (Round this number to the nearest ten)
You bought a new computer for $1200. (Round this number to the nearest thousand)
You got $1600 for Christmas from all of your family. (Round this number to the nearest thousand)
The students will have a worksheet that contains one column for the actual amount of money in their account, and the estimated amount in their account. They will write the actual number earned and spent in one column, and the number they rounded in the right column along with a plus or minus for depositing or spending. They will calculate the amount of money that should be in their bank account, and the estimated amount. They will compare and see how close their estimation was to the actual amount. How might rounding be helpful? When might you choose to round in regards to your bank account?

Gear Up: If the concept is too easy for the students, the teacher will give them problems that involve rounding twice. (Round 456 to the nearest ten. 460. Round that number to the nearest hundred. 500.) They will be given some cases such as, round 447 to the nearest ten. 450. Now round that number to the nearest hundred. 500. Compare these situations. Will rounding to the nearest ten and THEN rounding to the nearest hundred always be the same if you round directly to the nearest hundred? They will also be asked to add and subtract numbers and round the answer, as well as round numbers, and then add and subtract the rounded numbers. They will focus more on comparing the rounded numbers as well.

Gear Down: If the concept is too advanced for the students, the teacher will not move on to rounding the thousands place, and will only focus on the tens and hundreds place value.

Katie Atkins
4th Grade Level
Lesson Plan – Comparing Numbers

Real Life Application: Comparing numbers when traveling.

Indiana Standards Reference: Standard 1, Number Sense: *Students understand the place value of whole numbers and decimals to two decimal places and how whole numbers and decimals relate to simple fractions.*

4.1.4 Order and compare whole numbers using symbols for "less than" (<), "equal to" (=), and "greater than" (>).
Example: Put the correct symbol in 328 __ 142.

Objectives: The students compare numbers using the greater than and less than symbols on paper.

The students will order numbers by value on paper.

Entry Behavior:
3.1.2 Identify and interpret place value in whole numbers up to 1,000.
3.1.5 Compare whole numbers up to 1,000 and arrange them in numerical order.

Materials List: premade passports, plane tickets, gate number signs, computer, chart paper, markers, magnets, destination list, white board, marker

Engagement: The students will be given a passport and a plane ticket. Each student's ticket will have a different destination on it. The students will be told to get ready to board the plane! We are going on a trip today! Look at your passport to find out your surprise destination. Students will then find those who share the same destination and board their "plane." The teacher will have different seats around the room labeled with the gate number and destination.

Exploration: The students will use Google Maps Distance Calculator (http://www.daftlogic.com/projects-google-maps-distance-calculator.htm). The students will be given instructions to zoom into the map and locate their current city. They are to click and drop pin number one on their current city. They will zoom out of the map. They will then zoom in to locate the second spot (the destination on their ticket) and drop pin number two on their destination city. In the bottom left hand corner of the screen, there is a place that is labeled "Total Distance." The students are to record the whole number that has been calculated as their total distance. This activity will be done in small groups. The students will record their distance on the chart at the front of the classroom.

From Muncie, IN to:	Distance:
Washington D.C.	
Paris, France	
Brasilia, Brazil	

Canberra, Australia	

Explanation: The teacher will lead whole class discussion. The teacher will draw a number line on the whiteboard that is marked in increments of thousands. The students will place markers where they think the number should go on the number line. Which trip has the greatest distance? How do you know this? Which trip has the least distance traveled? How do you know this? What are you looking at when comparing these numbers? Which place value do you look at first? What can you conclude about comparing numbers? The students, with help from the teacher will also write symbolic sentences as well as word sentences to describe some of the relationships. For example, $345 < 468$. 345 miles is less than 468 miles.

Evaluation: The students will be "given" the opportunity to travel this summer break! They will have five destination options to choose from. They destinations are:

Destination:	Distance
Orlando, Florida	
Hollywood, California	
New York City, New York	
Chicago, Illinois	
Dallas, Texas	

The students will have to use the same online tool they used in the prior activity to find the distances from their hometown (Muncie, IN) to the destination city. After they find the distance the students will answer the following questions:
Which destination had the greatest distance?
Which destination had the least distance?
Which destination would you like to travel to?

The students will then order the destination distances from least to greatest. After they have completed this activity, they will get to choose the destination they would like to travel to over summer break!

Gear Up: If the concept is too easy for the students, the students will be given two destinations (such as I traveled to Indianapolis, IN and from there I flew to San Diego, CA) and they must add those distances and THEN compare them to another set of distances.

Gear Down: If the concept is too advanced for the students, the students will compare smaller numbers (distances within the U.S. or even distances within IN). After they can compare two to three-digit numbers, they can move to four-digit numbers.

Katie Atkins
4th Grade Level
Lesson Plan - Fractions: Whole Numbers as Fractions and Mixed Numbers

Real Life Application: Using fractions when working at a pizza parlor.

Indiana Standards Reference: Standard 1, Number Sense: *Students understand the place value of whole numbers and decimals to two decimal places and how whole numbers and decimals relate to simple fractions.*

4.1.5 Rename and rewrite whole numbers as fractions.
4.1.6 Name and write mixed numbers, using objects or pictures.
(Note: This is an extension from standard 3.1.8 Show equivalent fractions using equal parts. This standard is listed in the 4th grade curriculum guide.)

Objectives: Students will rewrite whole numbers as fractions on paper and using objects.

Students will write mixed numbers on paper and model with objects.

Entry Behavior:
3.1.8 Show equivalent fractions* using equal parts.
3.1.9 Identify and use correct names for numerators and denominators.
3.1.10 Given a pair of fractions, decide which is larger or smaller by using objects or pictures.

Materials List: bags with pizzas and people cut outs, *Pizza for Breakfast* by Maryann Kovalski, markers, white boards, larger pizzas with toppings and cut out pieces, pizza boxes

Engagement: The teacher will read *Pizza for Breakfast* by Maryann Kovalski. If you had your own pizza parlor, what kind of pizzas would you serve? Would it be big like the place that Frank and Zelda wished for, or small like the place that they really owned? How would you run your own restaurant? The students will be given the scenario that they are opening up their very own pizza parlor as a class. They will come up with a name for their pizza parlor. If a group of customers came in, what are some important things you must know before you fill their orders? The teacher will turn the focus slightly, and ask questions regarding fractions. What do we already know about fractions? What is the name for the top number? What is the name for the bottom number?

Exploration: The students will be given a bag with pizzas and people. Then they will be given different pizza orders. They will have to pick out the correct pizzas to fill the order. They will then have to share the pizza among a certain number of guests. The teacher will model this on the overhead. The teacher will explain to the students that the numerator is the number of pizzas that you would like to share, and the denominator is the number of

people you are sharing the pizzas with. For example: There are 4 pizzas and 2 guests. Write that as a fraction. The answer is 4/2. How many pizzas does each guest get? The answer is 2 pizzas. There are 2 pizzas and only one guest how many pizzas does the guest get? The answer is 2 pizzas. Could you tell me how the two problems that you just solved are similar? What can you tell me about the fraction 4/2 and 2/1? The answer is that they have the same value. What is the value? 2. In other words 4/2 and 2/1 are both ways to write the number 2 as a fraction. Can you think of another way to write 2 as a fraction? What are three different ways you can write the number 4 as a fraction? Show me with your pizzas and also show me using numbers. The students will continue to work similar problems. After the students have mastered using the pizzas and the people, they will be asked to show the numbers using only paper and pencil. The teacher will model on the board, the number 2. She will explain that any number over 1 is itself. (This should be review.) She will write 2/1. She will explain that we want to change the fraction, but keep the same value of this fraction, using equal parts. What number do you multiply a number by so that the answer, the product, is itself? The answer is 1. How can we write 1 as a fraction? Name three ways we can write 1 as a fraction. (This is a concept that has already been covered, but can be reviewed if necessary. Any number over itself is 1. 4/4, 8/8/ 10/10, etc...) The teacher will explain that we can multiply the fraction 2/1 by a fraction that is equal to 1, and the result, or product, will be a different but equivalent fraction, or a fraction of equal value. (2/1 x 4/4 = 8/4)

The teacher will give the students an order such as 4 pizzas for 3 people. How would you write this using the model previously shown (pizzas/people)? The answer is 4/3. What kind of fraction is this? What does improper mean? (Im- means not, so the fraction is not in its proper form. How can we change this fraction to put it in its simplest term, or the term in which nothing more can be done to it? The students will model, with their pizzas and people, the fraction as a mixed number. They will share the whole pizzas with the three customers (each getting one) and they will have one pizza left over (which they will have to split into thirds). How much pizza did each customer get? The answer is 1 1/3 pizza. What can we conclude about the best way to write 4/3? The students will continue to work similar problems. After the students have mastered using the pizzas and the people, they will be asked to show the numbers only using paper and pencil. The teacher will explain that when you have an improper fraction, you can look at it like a division problem. When you have the fraction 4/3, you can divide 4 by 3 and write the remainder as a fraction. This will give you the corresponding mixed number.

Explanation: Throughout the activity, the students will share their answers with a Neighbor, and explain how they reached that decision. They will compare answers, and if one is different, they can discuss the process and decide which answer is the best, or right, answer. The students will also come up and draw their models of pizzas and people on the board, and explain how they wrote their fractions and what numbers are represented. They will do the same with the number problems.

Evaluation: The students will set up their own restaurant scene. There will be four groups of students. The groups will be figured out prior to the lesson. Two groups will be customers and two groups will be restaurant workers. The restaurant workers will wait on the groups that are customers. They will take their orders, "make" their pizzas, and

deliver them to their tables. The workers will have to determine how much pizza each customer will get. Then the customers will have to check and make sure the workers did their math correctly. The customers will also order pizzas with different toppings and the workers will have to decide how to evenly divide the pizza. For example, if two customers order two cheese pizzas, and one pizza with half pepperoni and half sausage, the workers will have to figure out how they are going to divide it so that each topping has equal number of pieces (if a pizza has 8 pieces, 4 pepperoni and 4 sausage). They will also have to decide how much pizza each customer would get. (1 and a half pizzas) They will write on a "ticket" the answer to how much pizza each customer gets and give it to the customers. The customers will divide their pizzas and see if the number is correct. The customers will be instructed to give orders that result in whole number answers as well as mixed number answers so that both objectives are covered. This will ensure that all of the students know how to figure out the fractions of the pizza. It will also help the students know what it would be like to have their own restaurant or business.

Gear Up: If the concept is too easy for the students, the teacher will move on to reducing fractions. The teacher will emphasize the terms reduce, simplest terms, lowest terms, etc., and make sure that the students know that these terms all mean the same thing. The teacher will provide problems in which the students will have to reduce their final answer again (such as 1 2/4=1 ½).

Gear Down: If the concept is too advanced for the students, the teacher will focus only on working with the models, so that they can grasp the concept of exactly what it means to represent a whole number as a fraction. The teacher will not move on to the mixed number activity.

Katie Atkins
4th Grade Level
Lesson Plan - Decimals: Rounding

Real Life Application: Rounding decimals when shopping for Christmas presents.

Indiana Standards Reference: Standard 1, Number Sense: *Students understand the place value of whole numbers and decimals to two decimal places and how whole numbers and decimals relate to simple fractions.*

4.1.9 Round two-place decimals to tenths or to the nearest whole number.

Objectives: The students will round decimals to the nearest whole number on paper.

Entry Behavior:
3.1.6 Round numbers less than 1,000 to the nearest ten and the nearest hundred.
3.1.11 Given a set* of objects or a picture, name and write a decimal to represent tenths and hundredths.
3.2.1 Add and subtract whole numbers up to 1,000 with or without regrouping, using relevant properties of the number system.

Materials List: Premade "Wish Book", Christmas list worksheet, computer, construction paper, scissors, glue, markers,

Engagement: The teacher will read "The Last Christmas Present" by Matt Novak. This story is about a Christmas elf who delivers a present that was left behind at the North Pole. This will introduce the theme of Christmas and gift giving. Have you ever received a gift for Christmas? What was your favorite Christmas gift? Have you ever given a gift to someone on Christmas?

Exploration: The students will be given a "Wish Book" of items. Each item will have a price to accompany it. The prices on page one will all be whole numbers less than 1,000. The second page will have prices that include decimals. The students will use only the items on page 1 to begin with. The students will choose five items for their Christmas list and write them on their Christmas list page. They will round all of these prices to the nearest ten. They will add all of the prices together to find a total price. This should be review. The topic will now move towards rounding with decimals. Using what you know about rounding whole numbers, how might you round a decimal to the nearest whole number? How did you come to this conclusion? After the students explain their own ideas about rounding decimals to the nearest whole number, the teacher will model the process. The teacher will explain that when rounding a decimal to a nearest whole number, you must look at the number directly after the decimal, or the tenths place. She will teach a rhyme to help the students remember the rules for rounding. "4 or less, let it rest. 5 or more, raise the score!" The teacher will write this on a poster-sized paper to display in the room. The teacher will pose the problem, 'A bicycle costs $78.95. Round

this decimal to the nearest whole number.' The teacher will write $78.95 on the white board. Which place value will I look at if I want to round to the nearest whole number? (tenths) What is our rule for rounding? What will the price of this item be, if I round it to the nearest whole number? ($79.00) The teacher will model another problem, If a doll costs $21.39, what will the price of the doll be rounded to the nearest whole number? Which place value will I look out if I want to round to the nearest whole number? (tenths) What is our rule for rounding? What will the price of this item be if I round it to the nearest whole number? ($21.00) The students will be given "$200.00." The students will then look through the Wish Book and choose five items. They will round the price of each item to determine an approximate amount of all of the items. They need to meet the goal of five items under $200.00.

Explanation: Is it appropriate to round when making purchases? Why or why not? When might be an appropriate time to round decimals? The students will share their lists with a partner. The partners will compare their list of items and estimated amount with their partner's list of items and estimated amount. Who was closer to $200.00?

Evaluation: The students will trade their lists with someone who was not their original partner. Their new partner will have to locate the items and the prices in the Wish Book. They will round the decimal prices to the nearest whole number (or dollar). They will keep a running total of the Christmas list (using the rounded prices). They will find the overall rounded total of all of the items and then compare this with the total their partner came up with when they rounded the numbers. Are the totals the same? If not, why? If the totals are not the same, the partners will look through the items together and try to find the mistake, reminding each other of the rounding rules.

Gear Up: If the concept is too easy for the students, the students can use the computer to look up items and create their own Wish Book on construction paper. The prices in the Wish Book must be rounded to nearest whole number (dollar).

Gear Down: If the concept is too advanced for the students, the students will only pick items and round the numbers. They will not worry about the $200.00 limit, and they will not keep a running total of the items. They will continue to practice rounding, even if they meet the five item requirement.

Katie Atkins
4th Grade Level
Lesson Plan- Fractions: Whole Numbers as Fractions and Mixed Numbers

Real Life Application: Adding and subtracting decimals in a grocery store.

Indiana Standards Reference: Standard 2, Computation: *Students solve problems involving addition, subtraction, multiplication, and division of whole numbers and understand the relationships among these operations. They extend their use and understanding of whole numbers to the addition and subtraction of simple fractions and decimals.*

4.2.1 Understand and use standard algorithms for addition and subtraction.
4.2.10 Use a standard algorithm to add and subtract decimals (to hundredths).

Objectives: The students will add and subtract decimals on paper.

The students will round decimals to the nearest whole number on paper.

Entry Behavior:
3.2.1 Add and subtract whole numbers up to 1,000 with or without regrouping, using relevant properties of the number system.
3.2.8 Use mental arithmetic to add or subtract with numbers less than 100.
3.1.11 Given a set of objects or a picture, name and write a decimal to represent tenths and hundredths.
4.1.8 Write tenths and hundredths in decimal and fraction notations. Know the fraction and decimal equivalents for halves and fourths (e.g., $\frac{1}{2} = 0.5 = 0.50$, $\frac{7}{4} = 1\frac{3}{4} = 1.75$).

Materials List: Marsh Supermarkets advertisement, blank shopping lists, *At the Supermarket* by Anne Rockwell.

Engagement: The teacher will read the book *At the Supermarket* by Anne Rockwell. This book talks about a little boy who goes to the supermarket with his mom. It talks about all of the things that they need to buy at the store and why. Before reading the teacher will ask them if they have ever been to the supermarket with their parents. The teacher will ask them to give examples of things that they have gotten at the store. During the reading the teacher will stop periodically and ask how much money they think some of the items might be. After reading, the teacher will then tell them that today we will be pretending that we are going to the supermarket and they will be buying things with a certain budget for a dinner.

Exploration: The teacher will start by reviewing addition and subtraction of two and three digit numbers, making sure the students know the method of trading and renaming. The teacher will ask: What do we do next? What is this called? The students will then be

shown a decimal number. They will be asked to name the places of the number (tenths, hundredths, etc.) Where might you see a number like this in real life? One possible answer might be money, which is what is going to be the focus of the next activity. The teacher will model adding and subtracting two decimals. Add 3 tenths to 2 tenths. You now have 5 tenths. What does that look like as a problem? (0.3 + 0.2 = 0.5) What is 21 hundredths and 34 hundredths when you add them together. You now have 55 hundredths. What does that look like in a problem? (0.21 + 0.34= 0.55) What do you notice about these two problems? What do you notice about the numbers? What do you notice about the decimals? The students will do examples with the teacher. The teacher will repeat this process with subtraction. Subtract 5 tenths from 6 tenths. You now have 1 tenth. What does this problem look like? (0.6-0.5 =0.1) If you have 24 hundredths and you take 15 hundredths from that, what will be left? There are 9 hundredths left. What does this problem look like? (0.24- 0.15= 0.09) What do you notice about these two problems? What do you notice about the numbers? What do you notice about the decimals? The students will do examples with the teacher. The students will receive an advertisement from a Marsh Supermarket. They will be asked to plan a dinner for their friends and family. They will have to examine the advertisement and make a shopping list (7 to 10 items). A blank shopping list page will be provided. On a separate shopping list page, they will write down the item name and the price of the item. They will have to keep a running total of the cost of the dinner (a total after each item added). They must include the final total at the bottom of their list.

Explanation: Students will share their meal and the items they chose with the class. They will show the students the prices of the items and explain how they added them to get the total. Students can compare their final total to those of other students to see whose dinner was more expensive.

Evaluation: The students will exchange shopping lists (the one without prices) with each other. Then they will go through the advertisement and locate the items that are on the shopping list. They will write down the prices. They will keep a running total. They will include a final total as well. They will compare the total they added up with the total that the student who created the shopping list added up.

Gear Up: If the concept is too easy for the students, the teacher will go a little more in depth with the rounding activity. The students will have a larger budget and more requirements to what they must buy. They will also try to do some math mentally, just like you would in a grocery store.

Gear Down: If the concept is too advanced for the students, the students will only choose five items that are all under a dollar for their shopping list. They may use model coins to represent the addition of the amounts.

Katie Atkins
4th Grade Level
Lesson Plan – Multiplication

Real Life Application: Multiplying when playing sports and games.

Indiana Standards Reference: Standard 2, Computation*: Students solve problems involving addition, subtraction, multiplication, and division of whole numbers and understand the relationships among these operations. They extend their use and understanding of whole numbers to the addition and subtraction of simple fractions and decimals.*

4.2.2 Represent as multiplication any situation involving repeated addition.

Objectives: The students will represent multiplication as the sharing method.

Entry Behavior:
3.2.2 Represent the concept of multiplication as repeated addition.

Materials List: trashcan, tape, old scrap paper, whiteboard, string, large and small marbles, score sheets

Engagement: Make a list on the board of the students' favorite sports. Take a vote to see which sport is the favorite. How are the sports alike? How are they different? How does scoring work for each sport?

Exploration: What is multiplication? What are some of the "types" of multiplication we have already been introduced to? Repeated addition, arrays, Cartesian product. What is repeated addition? Today the students will break into "teams." Each team will participate in a paper basketball shootout. The teacher will have two trashcans lined up on the opposite sides of the room. She will have a spots marked on the floor that are equal distance from the trashcan. Students will clean out their desks and use old scrap paper for this activity. The teacher can also prepare by saving old assignments or extra papers. The students will line up at the mark on the floor. Each team will have two minutes to make as many paper baskets as they can. One student on each team will be scorekeeper and tally the amount of baskets their team makes. When the teacher says go the first person will crumble the paper into a ball and shoot at the trashcan. They will return to the end of the line and the next person will grab a paper from the pile and do the same. When the two minutes are up the scorekeeper will turn the tally sheets into the teacher, the students will put the trashcans back in their proper places, and sit down at their desks. The teacher will record the two scores on the board without revealing which team's score is which.

Explanation: How many points is a basket (not a three point shot) in a normal basketball game? 2 points. How can we use repeated addition to figure out how many points each team score? Example: One team scores 11 baskets
2+2+2+2+2+2+2+2+2+2+2= 22 points

What is an easier way to find the total number of points? Use multiplication. How can I show this using numbers?
2 x 11 = 22
How are repeated addition and multiplication related?

Evaluation: The students will be placed into pairs. Each pair will be given a string that is tied together at the ends, and a bag of two different sized marbles. The students will find a spot on the floor and set the string out so that it is a circle. They will place the marbles in a group in the middle of the circle, keeping two of the largest marbles out. They will then play a game of marbles, by shooting their large marble with their thumb into the group of marbles, and trying to knock them out of the string. At the end of the game, they should each have a collection of marbles. Each large marble is worth 7 points and each small marble is worth 4 points. The students will have to show their total number of points using repeated addition. They will also have to write an equation showing their points (using multiplication). For example if a student collects 5 large marbles and 6 small marbles they will write:

Small
4+4+4+4+4+4= 24
4 x 6 = 24 pts.
Large
7+7+7+7+7= 35
7 x 5 = 35 pts.
Total Points
24+35= 59 pts.

The students will play a second game, but this time small marbles are worth 9 and large marbles are worth 11. They will repeat the same process. Each student will complete his or her own score sheet. The teacher will collect the score sheets.

Gear Up: If the concept is too easy for the students, the students will multiply with numbers over 12. The marbles will have different points (large: 17, small: 13).

Gear Down: If the concept is too advanced for the students, the students will be asked to draw pictures with their numbers. They will draw all of the marbles and label them with the correct point value, that way they get a pictorial concept to accompany the abstract concept of using multiplication. This will help visual learners.

Katie Atkins
4th Grade Level
Lesson Plan – Division

Real Life Application: Dividing when helping the community.

Indiana Standards Reference: Standard 2, Computation*: Students solve problems involving addition, subtraction, multiplication, and division of whole numbers and understand the relationships among these operations. They extend their use and understanding of whole numbers to the addition and subtraction of simple fractions and decimals.*

4.2.3 Represent as division any situation involving the sharing of objects or the number of groups of shared objects.

Objectives: The students will represent division using the sharing method.

Entry Behavior:
3.2.3 Represent the concept of division as repeated subtraction, equal sharing, and forming equal groups.

Materials List: parent letter containing list of items, brown paper bags, food items, large chart paper, list of items #2,

Engagement: What is community service? What kinds of things do people do to help the community? What are some jobs that people have that help the community? What can you do to help the community? What is volunteering? The students will collect listed items throughout the week to complete this activity. The class will hold a mini food drive! The teacher will send a letter home to the parents a week prior that lists specific items to donate.

Exploration: What is division? What are some of the "types" of division we have already been introduced to? (Repeated subtraction, equal sharing, and forming equal groups.) What does it mean to form equal groups? What does equal sharing mean? Today the students will have a special job. They are going to make care bags for needy families in our community. There will be two stations, one with five bags and one with seven. In the bags we are going to provide food for these families. The students are going to fill the bags with equal amounts of food. The students will split into teams to complete this activity. Each group will have a different item that they will be placing in the bags. The teacher will be the "store" and the students will come and collect a certain number of items and then split them between the bags. For example:

Team A is assigned canned green beans. The teacher gives them 15 cans of green beans. They must then take the green beans over to the bags. There are five bags for the five families. They will place one can of green beans in each bag until all the green beans are distributed. How many cans of green beans were in each bag? The students will then come up to the board and fill in their spot on the chart:

Item:	Number of Items:	Number of Bags:	Number of Items in Each Bag:
Green Beans	15	5	3

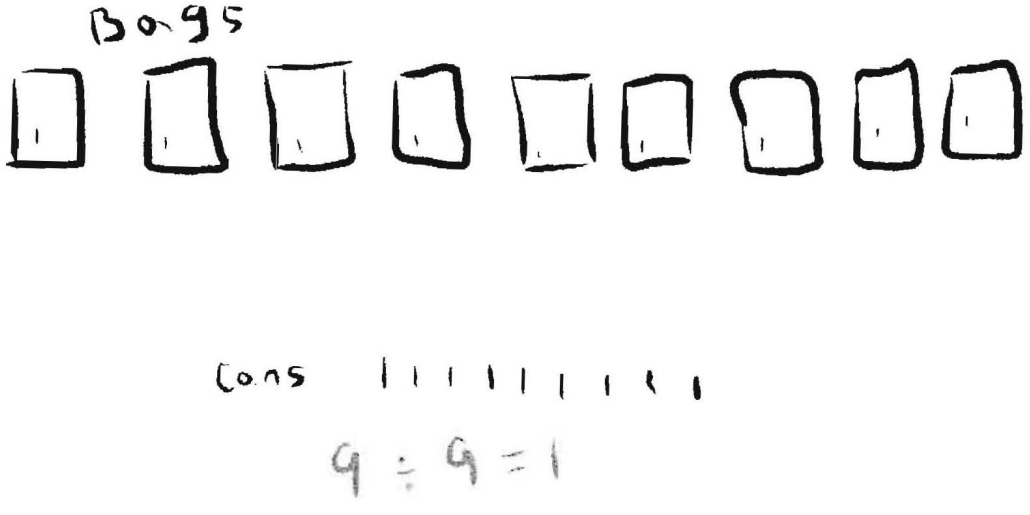
The students will then go back to the teacher and get another item. They will repeat this activity at Station 2 and record their information on the chart.

Explanation: The class will look at the chart together. What do you notice about the chart? Do you see a pattern? What operation is being used to get the number of items in each bag? Which number is the divisor? Which number is the dividend? Which number is the quotient? What process are we using for division? Repeated subtraction? Equal groups? Equal sharing? How do you know?

Evaluation: The students will receive a list of "donated" items similar to the one that was used in the Application activity. The list will include the following:

9 cans of soup
45 cans of green beans
36 cans of corn
18 cans of pineapple
63 cans of spaghetti sauce
81 boxes of noodles

The students will divide the food between nine families. The students will have to draw a picture of the distribution of the food to the nine families. They will then have to write number sentences corresponding with each food item.
For example: 9 cans of soup



The students will then have to create a final list of the number of items in each bag.

Gear Up: If the concept is too easy for the students, the teacher will give them a number

of items that does not distribute evenly into the bags, and the students will be introduced and work with remainders.

Gear Down: If the concept is too advanced for the students, the students will work Together, with the assistance of the teacher, to distribute the items in the bag. The teacher will slowly walk through the process of equal sharing with the groups each time.

Katie Atkins
4th Grade Level
Lesson Plan- Adding and Subtracting Fractions with Unlike Denominators

Real Life Application: Adding and subtracting fractions with unlike denominators when reading a recipe and cooking for a class celebration.

Indiana Standards Reference: Standard 2, Computation: *Students solve problems involving addition, subtraction, multiplication, and division of whole numbers and understand the relationships among these operations. They extend their use and understanding of whole numbers to the addition and subtraction of simple fractions and decimals.*

4.2.8 Add and subtract simple fractions with different denominators, using objects or pictures.

Objectives: The students will demonstrate, using manipulatives, the least common denominators for two fractions.

The students will demonstrate finding the least common denominator by writing it down on paper.

The students will add two fractions with unlike denominators, and provide a model using manipulatives as well as showing the process on paper.

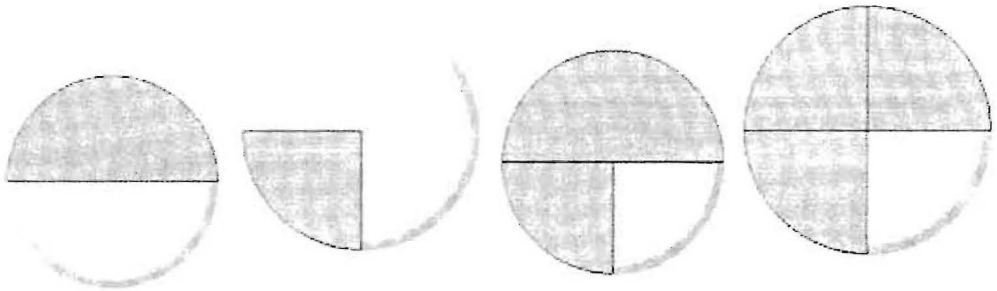
The students will subtract two fractions with unlike denominators, and provide a model using manipulatives as well as showing the process on paper.

Entry Behavior:
3.1.8 Show equivalent fractions using equal parts.
3.1.9 Identify and use correct names for numerators and denominators
3.1.12 Given a decimal for tenths, show it as a fraction using a place-value model. 3.1.10 Given a pair of fractions, decide which is larger or smaller by using objects or pictures.
3.2.6 Add and subtract simple fractions with the same denominator.

Materials List: Fraction circles, computer and StudyJams fraction video, Pre-made fraction problem index cards, marker and white board, measuring cups, water, oil, nuts, chocolate chips,

Engagement: The teacher will have the students watch the StudyJams fraction video (http://teacher.scholastic.com/activities/studyjams/fractions/) . This will lead into our discussion on adding and subtracting fractions. The video takes place in a restaurant. The characters explain fractions using a quesadilla. They provide vocabulary such as numerator and denominator. It provides pictures using a cooking theme and emphasizes the part to whole ratio. It also explains when you might see fractions in the real world such as sports, music, and money.

Exploration: The teacher will set up the scenario that the class is making food for a class party celebrating their outstanding job on the ISTEP test! They must be able to combine and remove ingredients in recipes. The teacher will revisit the concept of adding fractions with like denominators. This is something the students should already be able to do. The teacher will have them explain the process, by asking them what the steps are for adding fractions with like denominators. [sample problem: If you have 3/4 cup of water and you add 1/4 cup of oil, how much liquid will you have in your bowl? (4/4 or 1 whole cup)] The teacher will demonstrate this with the students by measuring out ¾ cup of water and ¼ cup of oil into a measuring cup. The students can assist by pouring the liquids. The end result will show one whole cup. The teacher will then show a sample problem with fractions of unlike denominators. [sample problem: You need to combine ½ cup of chocolate chips and ¼ cup of nuts? How many cups will you have altogether? (6/8)] The teacher will model this with student assistance using the measuring cups. What is the difference between the first problem and the second problem? (The first problem has the same denominator, and the second doesn't.) What should we do with the second problem to make it look like the first? (Find the least common denominator.) The least common denominator is the smallest number that can be used for all denominators. I will hand out fraction circles to the students. The teacher will have the students model one whole. The teacher will then have the students model the first fraction (1/2) and then model the second fraction (1/4). Can you make both fractions using all the same color pieces?



This is the least common denominator. This is the first step in adding or subtracting fractions with unlike denominators. Then ask the students how to solve the rest of the problems. (Just like the original problem. Add the numerators, and keep the denominators the same.) Use the circles to model a couple more least common denominators. [1/3 cup peanut butter +1/4 cup of cocoa = ____ (7/12) 1/2 cup of flour-1/10 cup of milk = ____ (6/10)]

The teacher will hand out index cards to each student. Half of the note cards will have a problem containing an unlike denominator addition or subtraction problem. The other half of the cards will have the corresponding common denominators to the problems on the other half. In random order, hand out the note cards and have the students find their matching partner and work the problem out. When the problem is solved, the pair will turn the cards over and there will be a recipe on the back of the cards. This will allow the students to see the correct answer. An example follows:

card 1 matches card 2	
$\frac{1}{2}$ cups + $\frac{1}{4}$ cups	4 cups + 4 cups

Explanation: The teacher will have each pair share their problem with the group, with an explanation of how they solved it. This will reinforce the concept and procedures they have just learned. The teacher will verbally and visually reinforce the concepts as well by reviewing the steps previously learned on the white board.

Evaluation: The class will be split up into two teams. The students will work independently with their own white board answering questions given aloud by the teacher. All the students will answer the questions, but students will take turns coming to the front and sharing their responses. If the student gets the correct answer, the team receives a point. They must show all work and have the correct answer. The students will take turns explaining to the group how they got the correct answer. The questions asked will follow the cooking theme. [sample problem: You need to combine ½ cup of chocolate chips and 1/8 cup of oats. How many cups will you have altogether? (5/8)]

Gear Up: If the concept is too easy for the students, the teacher will give them problems that have mixed numbers rather than simple fractions. The students will focus on doing the problems abstractly rather than concretely.

Gear Down: If the concept is too advanced for the students, the students will focus mainly on using fractions where one denominator is the factor of the other denominator. The students will spend more time using direct modeling with manipulatives and drawings until the skill has been mastered.

Katie Atkins
4th Grade Level
Lesson Plan – Equations

Real Life Application: Understanding equations with summer jobs.

Indiana Standards Reference: Standard 3, Algebra and Functions: *Students use and interpret variables, mathematical symbols, and properties to write and simplify numerical expressions and sentences. They understand relationships among the operations of addition, subtraction, multiplication, and division.*

4.3.4 Understand that an equation such as $y = 3x + 5$ is a rule for finding a second number when a first number is given.

Objectives: The students will determine a rule for a given situation and substitute values 1 through 10 in for the variables to find a solution.

Entry Behavior:
3.3.1 Represent relationships of quantities in the form of a numeric expression or equation.
3.3.2 Solve problems involving numeric equations.

Materials List: tables, supplies for displays (poster boards, construction paper, crayons, markers, paint, glue, scissors), equations sheet, graph paper

Engagement: Students will get into pairs. They will choose a job they would like to have for the summer (something realistic). They will create a visual display (poster, tri-fold, etc…). They can make it as colorful and creative as they want. They can name their "business' and come up with a slogan.

Exploration: The fourth grade is going to host a mock summer job fair for the 4th grade students. Students will work in pairs to create their own booths for the job fair. Each pair will choose a possible summer job. Tables will be set up where they can place their visual display introducing their job. They will describe what their job is and how they would do it. They will describe how they will get paid for this job. For example one pair may choose the job of walking dogs. The price for walking dogs each day could be $y=3x+2$ where 2 is the amount being paid just come to the house each day. 3 represents the 3 dollars charged for each dog, and x is the number of dogs. Y is the total cost. The students will then determine the amount of money they would earn per day if they walked their neighbor's x amount of dogs (Find y when $x = 2$). They will find the total cost for the numbers 1 through 10. (x= 1,2,3,4,5,6,7,8,9,10) Other jobs may be run a lemonade stand, mow lawns, pull weeds, etc. Another example could be the job of mowing yards. The equation for mowing yards might be $5x + 10 = y$, where 10 represents 10 dollars being paid just for coming to each house. 5 is the amount paid per hour, and x is the number of hours it takes to complete the mowing. Y is the total cost.

Explanation: The students will take turns walking around to the different booths. Each student will visit two other booths. At each booth, the pair will explain their chosen jobs and equations for finding the cost of the service. They will explain what each variable means in the equation. They will also explain their chart of the solutions for numbers 1 through 10.

Evaluation: The students will receive a list of the equations for all of the jobs that have been created for the job fair. The list will include what x and y represent. The students will have to evaluate all of the equations with the values 5 through 10. (x=5,6,7,8,9,10) Which job will make you the most money? Which will make the least? The students will turn this into the teacher to be evaluated.

Gear Up: If the concept is too easy for the students, the students will graph the values on a coordinate graph. They will use this to further analyze their data. They can also graph more than one equation on the same graph and compare the results.

Gear Down: If the concept is too advanced for the students, the students will be provided with equations instead of having to come up with one on their own. They will focus on solving the equation using different values of x, and the meaning of each variable and how it affects the total amount.

Katie Atkins
4th Grade Level
Lesson Plan – Number Patterns

Real Life Application: Relating multiplication and division through cooking at a camp.

Indiana Standards Reference: Standard 3, Algebra and Functions: *Students use and interpret variables, mathematical symbols, and properties to write and simplify numerical expressions and sentences. They understand relationships among the operations of addition, subtraction, multiplication, and division.*

4.3.6 Recognize and apply the relationships between addition and multiplication, between subtraction and division, and the inverse relationship between multiplication and division to solve problems.

Objectives: The students will apply the relationship between addition and multiplication.

Entry Behavior:
3.2.2 Represent the concept of multiplication as repeated addition.
3.3.2 Solve problems involving numeric equations.

Materials List: items for obstacle course (cones, ropes, etc..), whiteboard, 5 cartons of eggs, 5 loaves of bread, 5 packages of sausage, portable skillet, toaster, milk, butter, juice, plates, napkins, plastic eating utensils,

Engagement: Welcome to Camp Atkins! (Substitute your last name) The first activity of the day will be an obstacle course! The teacher will take the students outside, where an obstacle course will be set up. The students will split into teams and have a race to see who can complete the obstacle course the fastest. Then the students will come inside and have a short rest before the lesson begins.

Exploration: The students will be cooking breakfast for the entire camp! The first thing on the menu for today is scrambled eggs. How many eggs are in a dozen? I have five dozen eggs to cook for the whole camp. How would I represent the amount of eggs using addition?
12+12+12+12+12=60
Can I represent this using a different operation?
5 x 12 = 60
Toast is also on the menu! How many slices of bread are in a loaf? (Find on package of bread. We will use 20.) I have five loaves. How many slices of bread do I have altogether. Use addition to find the total amount of pieces of bread.
20+20+20+20+20=100
Can I represent this using a different operation?
5 x 20 = 100
The last item on the menu is sausage links! How many sausage links come in a package? (Find on package. We will use 15.). I have five packages. How would I represent the amount of sausage links using addition?

15+15+15+15+15= 75
Can I represent this using a different operation?
5 x 15 = 75

Explanation: What two operations did we use? What do you notice about the relationship between addition and multiplication? The class will discuss the answers together and make a conclusion about the relationship.

Evaluation: The students will be given a menu for the camp's lunch. The menu is: Ham sandwiches, Pringles, and a Fruit Roll-Up. If there are 20 pieces of bread in a loaf, 18 pieces of ham in a package, 30 Pringles in a package, and 8 Fruit Roll-Ups in a package, find the total amount of each item using repeated addition. Then represent the same number sentence using multiplication.

Gear Up: If the concept is too easy for the students, the students will move into studying the relationship between subtraction and division. They will take the total number and repeatedly subtract given amounts to find how much of each item a camper will receive. They will write a number sentence using subtraction and division.

Gear Down: If the concept is too advanced for the students, the students will use number cubes to help them visualize the process of repeatedly adding and relating that to multiplication. By using a manipulative they will have a concrete representation to assist them in their understanding of the relationship.

Katie Atkins
4th Grade Level
Lesson Plan – Multiplication and Division

Real Life Application: Multiplying and dividing while have a class party.

Indiana Standards Reference: Standard 3, Algebra and Functions: *Students use and interpret variables, mathematical symbols, and properties to write and simplify numerical expressions and sentences. They understand relationships among the operations of addition, subtraction, multiplication, and division.*

4.3.7 Relate problem situations to number sentences involving multiplication and division.

Objectives: The students will write number sentences for multiplication and division situations.

Entry Behavior:
3.3.6 Solve simple problems involving a functional relationship between two quantities.

Materials List: White boards, parent letter, 150 jelly beans, 60 chocolate chip cookies, 30 cups, 30 plates, six apples and a knife, party planning list with questions, colored cubes

Engagement: The students will work all week to earn a party for positive behavior! The teacher will write REWARD on the board. Throughout the week the students will to earn letters on the board. If the whole class turns their homework in every morning on time, they will earn a letter. (Prepare for this to take longer than a week.) The teacher will color in a letter when one is earned. When the entire word is colored the students will get a reward party! A letter will be sent home to parents to provide healthy snacks and treats for the students. The teacher will provide some items as well.

Exploration: Before the students partake in the actually party, they will have to solve problems involving the treat items that have been collected. They must answer all of the questions before they receive their treats. We have 150 jellybeans to share among the 30 members of our class. Write a number sentence for this problem and use it to find how many jelly beans each member of the class will receive. We have 60 chocolate chip cookies to share among our 30 class members. Write a number sentence for this problem and use it to find how many chocolate chip cookies each member of the class will receive. 10 of the students brought 3 cups each, do we have enough cups for all 30 students? Why or why not? If we need 30 plates and five students bring in the same amount of plates, how many plates will each student bring in? If I have six apples, how many pieces do I need to cut each apple into so that every person in the class gets one piece? What about two pieces?

Explanation: After the students have answered the questions, the teacher will pass out the items to the students. The students will check their answers with the amount of items they have received! The teacher will also show the cutting of the apple, and count the number of plates and cups each student brought, to show the students the correct answers. The students will discuss how they got their answers before they enjoy their reward treats.

Evaluation: The students will plan their own birthday party for themselves and 11 friends. They will be given a list of the party food and treats along with questions about each treat.

You have Oreos, juice boxes, M&M's, pretzels, and cake.

Answer the questions and write a number sentence for each question showing how you came up with your answer.

If you have 36 Oreos, how many Oreos will each guest (including yourself) receive?
How many juice boxes must you have for each person to receive two juice boxes during the party?
If you have 108 M&M's how many M&M's will each guest receive?
If you have 144 small pretzels, how many pretzels will each guest receive?
If you have 2 cakes and you cut them into twelve pieces each, how many pieces of cake will you have altogether? How many will each guest receive?

The students will answer the questions showing all work, and number sentences and turn this into the teacher.

Gear Up: If the concept is too easy for the students, the students will plan a party for the entire grade (three digit numbers multiply and divided by two or three digit numbers). The teacher will provide an alternative list for the grade level party.

Gear Down: If the concept is too advanced for the students, the students will draw pictures of the items in each group so that they can see a pictorial representation of the numbers. Manipulatives such as colored cubes can be provided as well.

Katie Atkins
4th Grade Level
Lesson Plan – Number Lines

Real Life Application: Understanding number lines with a carnival theme.

Indiana Standards Reference: Standard 3, Algebra and Functions: *Students use and interpret variables, mathematical symbols, and properties to write and simplify numerical expressions and sentences. They understand relationships among the operations of addition, subtraction, multiplication, and division.*

4.3.8 Plot and label whole numbers on a number line up to 100. Estimate positions on the number line.

Objectives: The students will be able to draw a number line, and plot and label numbers up to 100 on that number line.

Entry Behavior:
3.3.7 Plot and label whole numbers on a number line up to 10.

Materials List: plastic masks, glue, paint, glitter, sequins, feathers, drawing paper, markers, crayons, butcher paper, number line sheet, all materials for carnival booths (for number line booths, Frisbees, flags and baskets, ping-pong balls, buckets, light up machine, mallet), stamp

Engagement: Students will decorate carnival masks using glitter, glue, paint, sequins, and feathers. They will get to wear these masks to the carnival. The teacher will introduce that a school carnival is going to take place, and the fourth grade gets to help plan it!

Exploration: The students will plan and help set up a carnival for the school. The booths will be set up using a number line system. To plan for this the students will draw a blueprint of how the carnival will be set up. Before this the class will have a discussion about how to make a number line. If we want our number line to go to 100, what numbers should we first put on the number line? Why? What number(s) would we put on the number line next? How do we know where to put it? They will draw a number line and space out the booths appropriately, plotting and labeling each booth with a number. There will be a key that shows which booth belongs to which number. After the students have created their own blueprints, the class will make one large blueprint combining the students' ideas for the carnival. They will get to choose which booths will be present at the carnival, and where they are located. They will have open discussion about the set up, and the students will take turns potting the booths on the large number line blueprint. The students will then have the opportunity to design what booths may look like. Why is a number line a good choice to use when planning the set up for the carnival? What is important to remember when planning which numbers the booths will be set up on?

Explanation: The students will have open discussion regarding the different booths and where they should be located. They need to plan for size when making their blueprint. They need to explain where the booth will be located, why it is the best location, and anticipated size of the booth. Students may also share their individual blueprints in small groups so they have the opportunity to show their ideas.

Evaluation: Although not all of the games at the carnival will be based on a number line there will be some that are. Students will be REQUIRED to visit these booths. This will be an informal evaluation. The following booths will be number line based:

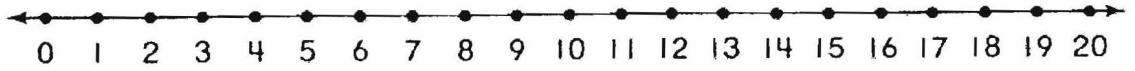
Frisbee Golf: A Frisbee golf range will be set up where each "hole" is a number on a number line. The students will throw the Frisbee and try to make it into the "holes."

Hammer Game: The students will use a mallet to hit the target and the harder their hit the higher the lights will light up. Each light represents a number on a number line.

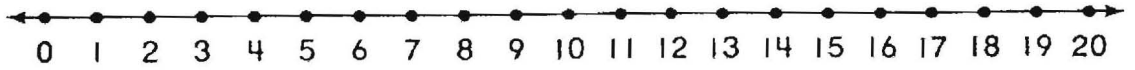
Ball Toss: The students will be given ping-pong balls. There will be buckets in a line in front of the students. The students will try and toss the ball into the buckets in order. If they miss a bucket they must keep throwing toward that bucket until they make it. They will throw until they run out of ping-pong balls. Each bucket will represent a number on the number line.

Number draw: The students will randomly draw a number from 20 to 100 and must make a number line marking the numbers 10, 20, 30, ... 100 and then placing their number accurately on the number line.

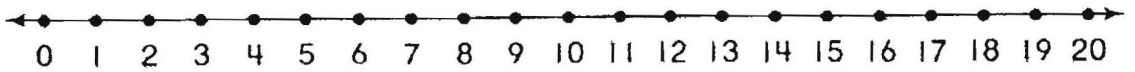
The students will have a paper they must get stamped at each station, proving that they completed the number line activities. The students must fill out the paper, which states:
I completed these holes at the Frisbee Golf Booth:



I reached this light on the Hammer Game:



I threw my ping-pong ball into these buckets at the Ball Toss:



The students will circle the numbers on the number line. This will be turned into the teacher. The number line the students had to draw in the last game will also be turned in.

Gear Up: If the concept is too easy for the students, the students will have to compare their number lines to those of a classmate. They will write how the numbers are similar and how they are different.

Gear Down: If the concept is too advanced for the students, the students will only work with a number line of numbers from 1 to 10.

Katie Atkins
4th Grade Level
Lesson Plan – Angles and Lines

Real Life Application: Identifying, describing, and drawing lines and angles on a flag.

Indiana Standards Reference: Standard 4, Geometry: *Students show an understanding of plane and solid geometric objects and use this knowledge to show relationships and solve problems.*

4.4.1 Identify, describe, and draw rays, right angles, acute angles, obtuse angles, and straight angles using appropriate mathematical tools and technology.
4.4.2 Identify, describe, and draw parallel, perpendicular, and oblique lines using appropriate mathematical tools and technology.

Objectives: The students will identify, describe, and draw parallel, perpendicular, and oblique lines.

The students will identify, describe, and draw rays, right angles, acute angles, obtuse angles, and straight angles.

Entry Behavior:

3.4.2 Identify right angles in shapes and objects and decide whether other angles are greater or less than a right angle.
3.4.6 Use the terms *point*, *line*, and line *segment* in describing two-dimensional shapes.
3.4.7 Draw line segments and lines.

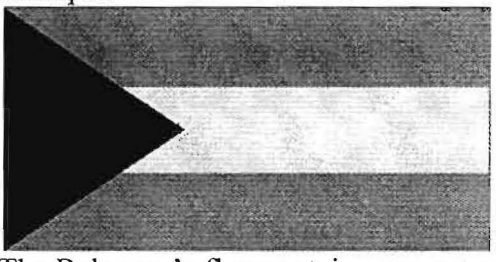
Materials List: computer, social studies book, white paper, markers, crayons, tape, white board, Geogebra, 11x17 white paper

Engagement: The students will be assigned a country. They will use the computer and/or social studies book to do research on that country's flag. They can research the origin of the flag and what the colors and design mean. They will draw and color that flag.

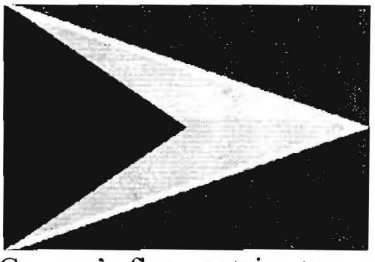
Exploration: The teacher will hang the flags up on the whiteboard with the country name written underneath it. After all of the flags are hanging on the board, the teacher will ask the students to identify what the flags have in common, and what is different about the flags? These flags all have different lines and angles that make up their designs. What is a line? It is a two-dimensional object that has no endpoints and continues on forever in a plane. What is a line segment? It is the set of points consisting of two distinct points and all in between them. What is the difference between a line and a line segment? There are three different scenarios that two geometric lines can take. What are those three scenarios? Lines can be parallel, perpendicular, or oblique. What does it mean for lines to be parallel? They are on the same plane and lines that have no points in common (they do not intersect). What does it mean for lines to be perpendicular? They form a 90-degree

angle. What does it mean for lines to be oblique? They are not parallel or perpendicular. They might intersect but not at a 90-degree angle. What is a ray? It is a portion of a line which starts at a point and goes off in a particular direction to infinity. What is an angle? It is the union of 2 rays that have the same endpoint. What are the different types of angles? The different types of angles are acute, obtuse, right, and straight. Define these types of angles. An acute angle measures less than 90 degrees but greater than 0 degrees, an obtuse angle measures greater than 90 degrees but less than 180 degrees, a right angle measures 90 degrees, and a straight angle measures 180 degrees and forms a line

Explanation: Can you see any of these lines or angles on any of the flags we have on the board today? The students will work in groups to identify the different characteristics of the flags. The teacher and students will point out and label the different lines and angles on the flags. Each flag must be labeled with at least one of these characteristics. For example:



The Bahamas's flag contains an acute angle and parallel lines.



Guyana's flag contains two acute angles.

Jamaica's flag contains two obtuse angles, two acute angles, and oblique lines.

Evaluation: The students will be given a 11X17 sheet of white paper. On this paper they will create a flag representing our school. They must include four of the following characteristics: oblique lines, parallel lines, perpendicular lines, acute angle, right angle, obtuse angle, straight angle. They may color and decorate their flag however they like. They must label the lines and angles they include on their flag. The students will present their flag to the class, describing the characteristics he/she chose, and the teacher will hang the flags around the room.

Gear Up: If the concept is too easy for the students, the students will use the computer program Geogebra to create their flag.

Gear Down: If the concept is too advanced for the students, the students will only practice identifying right angles and lines in the flags.

Katie Atkins
4th Grade Level
Lesson Plan – Lines

Real Life Application: Identifying, describing, and drawing lines and line segments on a map.

Indiana Standards Reference: Standard 4, Geometry: *Students show an understanding of plane and solid geometric objects and use this knowledge to show relationships and solve problems.*

4.4.2 Identify, describe, and draw parallel, perpendicular, and oblique lines using appropriate mathematical tools and technology.

Objectives: The students will identify, describe, and draw parallel, perpendicular, and oblique lines.

Entry Behavior:

3.4.6 Use the terms *point*, *line*, and line *segment* in describing two-dimensional shapes.
3.4.7 Draw line segments and lines.

Materials List: butcher paper, yardstick, compasses, rulers, 11x17 white paper, Indiana map, markers, computers, Geogebra, *I Go With My Family to Grandma's* by Riki Levinson

Engagement: The teacher will read *I Go With My Family to Grandma's* by Riki Levinson. This book talks about five kids who travel with their families every Sunday to their grandma's house. They all go by different means, bus, trolley, ferry..etc. Do your grandparents live in the same city as you? If you did not know how to get to your grandparents' house, what is something that could help you get there? What if you wanted someone else to know how to get to your house or your grandparents' house. What is one thing that might help them find their way? A map!

Exploration: When you look at a map, what kind of things do you see? What geometric objects do you see? What do they stand for? Lines usually stand for streets and highways. This is one of the most important parts of a map used for traveling. What is a line? It is a two-dimensional object that has no endpoints and continues on forever in a plane. What is a line segment? It is the set of points consisting of two distinct points and all in between them. What is the difference between a line and a line segment? Are the lines on the Indiana map the type of lines we talk about in geometry? No, they are not straight. We are going to create a map today that does contain geometric lines and segments. There are three different scenarios that two geometric lines can take. What are those three scenarios? Lines can be parallel, perpendicular, or oblique. What does it mean for lines to be parallel? They are on the same plane and lines that have no points in common (they do not intersect). What does it mean for lines to be perpendicular? They form a 90-degree angle. What does it mean for lines to be oblique? They are not parallel or perpendicular.

They might intersect but not at a 90-degree angle. On our Indiana map, the roads are not straight so they cannot qualify as geometric lines. However there are perpendicular and parallel lines on our map. Where can you see parallel and perpendicular lines on our Indiana map? Lines of latitude and longitude show parallel and perpendicular lines. We are going to create a map of our city (or neighborhood depending on how big the city is). The teacher will have a large piece of butcher paper in the front of the room. With the help of the students, the teacher will use a large marker and yardstick and compass to draw lines and segments representing the streets in the city or neighborhood. (Lines will be roads that extend off of the page, and segments will be roads that have two distinct endpoints on the page.) The teacher will give instructions on how to construct parallel and perpendicular lines using a compass.

Explanation: The teacher will lead the class in discussion. Which lines or segments are parallel? Which lines or segments are perpendicular? Which lines are oblique? How do you know this? Students will come to the board and label the different lines on the map.

Evaluation: The students will be given a 11X17 sheet of white paper. On this paper they will create a map of the school. They must include all of the hallways. They can include sidewalks, parking lots, playgrounds, etc… They will use rulers and protractors to draw the lines and segments. They will label them as parallel, perpendicular, or oblique.

Gear Up: If the concept is too easy for the students, the students will use the computer program Geogebra to create their map.

Gear Down: If the concept is too advanced for the students, the teacher will have a prepared paper with lines already on the sheet. The students will need to classify as parallel, perpendicular and oblique.

Katie Atkins
4th Grade Level
Lesson Plan – Shapes

Real Life Application: Exploring shapes through street signs.

Indiana Standards Reference: Standard 4, Geometry: *Students show an understanding of plane and solid geometric objects and use this knowledge to show relationships and solve problems.*

4.4.3 Identify, describe, and draw parallelograms, rhombuses, and trapezoids, using appropriate mathematical tools and technology.

Objectives: The students will identify, describe, and draw parallelograms, rhombuses, and trapezoids.

Entry Behavior:
3.4.1 Identify quadrilaterals* as four-sided shapes.

Materials List: cut out street signs, computer and projector, large chart paper, marker, "log" for keeping track of the signs and shapes, construction paper, markers, crayons, *Good Driving, Amelia Bedelia* by Herman Parish

Engagement: The teacher will read *Good Driving, Amelia Bedelia* by Herman Parish. This is a comical book about a maid who learns to drive. What kinds of things do you see when you are riding in a car? What do you notice outside?

Exploration: Today we're going on a trip. We are going to drive, and as we drive, pay close attention to what sort of signs you see on the side of the road. What are some common signs you see when you ride to school every day? What shapes are those signs? The teacher will simulate a car ride. The students will travel with their table groups each starting at a different sign. They will rotate around to the next sign until they have been to all of the signs. As the students are traveling, they will stop when road signs appear. (The teacher can place signs around the room or show them using the computer projector.) As they reach the road signs, they will discuss the characteristics and determine if it is a parallelogram, rhombus, or trapezoid, (the shapes can be more than one or none at all). The teacher will ask: How many sides does this shape have? Are all four sides parallel? Is one pair of sides parallel? Are all four sides of equal length? Parallelograms are quadrilaterals with both pairs of opposite sides parallel. A rhombus is a parallelogram four equilateral sides (sides of equal length). A trapezoid is a parallelogram with at least one pair of parallel sides. The teacher will write these definitions on a large piece of chart paper to hang on the front board so that the students can refer to it during the activity.

Explanation: What can we call this shape? The students will discuss with their groups the characteristics of the shapes and which names fit with which shapes. They will keep a log of the sign, and their decision on which shape it represents. They will draw a picture of the sign and write the correct terms beside it.

Examples:

Parallelogram, rhombus, trapezoid

Trapezoid

None

Parallelogram, trapezoid

Parallelogram, trapezoid

None

Parallelogram, trapezoid

Parallelogram, trapezoid

Parallelogram, rhombus, trapezoid

Trapezoid

None

Evaluation: The students will create their own signs specific for our classroom. They must create AT LEAST one sign for each shape (rhombus, parallelogram, trapezoid). They will have a total of AT LEAST three signs, although some may represent more than one shape. The signs can be warnings signs, rule signs, or signs made just for fun! They can color and decorate their signs. They must label ALL of the shapes the sign represents on the back of the sign.

Gear Up: If the concept is too easy for the students, the students will learn characteristics of other shapes such as triangles, pentagons, hexagons, octagons, and other polygons. They will identify signs that are these shapes, and draw signs that represent these shapes as well.

Gear Down: If the concept is too advanced for the students, the students will only identify the shapes as quadrilaterals or not quadrilaterals. They will draw a sign that is a quadrilateral and one that is not.

Katie Atkins
4th Grade Level
Lesson Plan – Symmetry

Real Life Application: Symmetry through everyday objects.

Indiana Standards Reference: Standard 4, Geometry: *Students show an understanding of plane and solid geometric objects and use this knowledge to show relationships and solve problems.*

4.4.5 Identify and draw lines of symmetry in polygons.

Objectives: The students will identify and draw lines of symmetry for shapes and objects.

Entry Behavior:
3.4.8 Identify and draw lines of symmetry in geometric shapes (by hand or using technology).
3.4.9 Sketch the mirror image reflections of shapes.

Materials List: white paper, scissors, chart containing letters of the alphabet, permanent marker, Navajo rug pictures, scavenger hunt worksheet

Engagement: Students will cut out snowflakes. They will do this by folding a piece of white paper in half and cutting out designs. What do you notice about the snowflakes? What do you notice when they are folded? What do you notice when they are open? What does the fold represent?

Exploration: In the snowflakes that the students cut out in the engagement activity, they should be able to see that both sides of the snowflake are the same. This means that the snowflake is symmetrical. The fold is the line of symmetry. This is the line that "cuts" the shape into two identical parts. If the parts are not identical, it is not a line of symmetry. You should be able to fold the shape at the line of symmetry, and the parts should fit together perfectly. Today we will look at things that we see every day and determine whether they have a line of symmetry or not. We will start with the alphabet. Which letters have a line that cuts it in half to form two identical parts?

A B C D E F

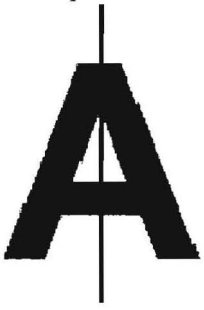
G H I J K L

M N O P Q R

S T U V W X

Y Z

Example:



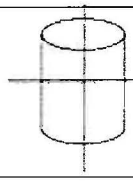
After the class has looked through the entire alphabet together, they will split into pairs. Some letters will have more than one line of symmetry. The teacher will emphasize that many times, there exists multiple lines of symmetry.
Each pair will be given a strip of pictures of Navajo rugs.

The students will work together to draw as many lines of symmetry as they can find for these rugs.

Explanation: The pairs will form small groups and the students will share their findings. Do you have a line of symmetry that another pair does not have? If the pairs have different lines of symmetry they will analyze their rugs again, and determine if it is in fact a line of symmetry. The class will come together as a whole, and mark the lines of symmetry each group has found, together.

Evaluation: The students will participate in a scavenger hunt around the classroom (or the entire school, if that is an option). They will be looking for objects they see everyday and determining how many lines of symmetry these objects have. They will be given a scavenger hunt sheet where they are required to draw the object and fill in the blanks. They may only find ONE object that has one line of symmetry. The other objects MUST have more than one.

Example:

Draw and label symmetrical shape:	**How many lines of symmetry?**
Example:  Teacher's pencil holder	There are **two lines** of symmetry in my teacher's pencil holder.
	There are _____ lines of symmetry in _____ _____.
	There are _____ lines of symmetry in _____ _____.
	There are _____ lines of symmetry in _____ _____.
	There are _____ lines of symmetry in _____ _____.

Gear Up: If the concept is too easy for the students, the students will be introduced to rotational symmetry. They will identify shapes with rotational symmetry during the scavenger hunt as well.

Gear Down: If the concept is too advanced for the students, the students will only be required to find one line of symmetry for an object. They will only draw the picture and draw the line.

Katie Atkins
4th Grade Level
Lesson Plan- Area and Perimeter

Real Life Application: Finding area and perimeter when designing a house.

Indiana Standards Reference: Standard 5, Measurement: *Students understand perimeter and area, as well as measuring volume, capacity, time, and money.*

4.5.3 Know and use formulas for finding the perimeters of rectangles and squares.
4.5.4 Know and use formulas for finding the areas of rectangles and squares.

Objectives: The students will find the perimeter of the rooms in the floor plan of a house.

The students will find the area of the rooms in the floor plan of a house.

Entry Behavior:
3.5.3 Find the perimeter of a polygon.
3.5.4 Estimate or find the area of shapes by covering them with squares.

Materials List: tape, 1-inch cut popsicle sticks, recording sheet, 1X1 inch tiles, 1x1 inch square graph paper, "Construction Logs", butcher paper

Engagement: Imagine the house of your favorite celebrity? What does it look like? How big is it? How many rooms does it have? What kind of rooms does it have?

Exploration: The teacher will have different sized rectangles and squares taped off around the room. These squares will represent the floors of houses (of course, they will be to scale 1 inch=1 foot). The students will be given popsicle sticks that have been cut to one-inch sections. The sticks represent the walls of the building. Each student will place a stick around the rectangle until the perimeter is completely covered. The class will count how many sticks it took to build the walls around the house. This measurement is called the perimeter. The students will work in groups and repeat the process on the other pre-taped rectangles around the room. They will record the measurement of each side, and the number of sticks it took around the whole rectangle. The students will then each be given a 1inch X 1inch tile. Now that we have created the walls of our building, we are going to lay down the floor. Each student will take a turn placing his or her tile across the rectangle until the entire rectangle is covered. Count how many tiles it took to cover the whole figure. This is called the area. The students will work in groups and repeat the process on the pre-taped rectangles around the room. They will record the measurement. The teacher will make one big chart with the measurements of the whole class. One column will have the measurements of one side (length), the second column will have the measurements of the other side (width), the third column will have the perimeter, and the fourth column will have the area. For example:

Length	Width	Perimeter	Area
12	10	44	120

6	**6**	**24**	**36**

Can you find a pattern between the length, width, and perimeter? Can you find a pattern between the length, width, and area?

Explanation: The students will share the patterns they have found with their group members. The class will come together as a whole again and discuss the patterns that were found. The teacher will show the relationship between the variables. 2(length) + 2(width)= Perimeter and length x width= Area. These are the formulas for perimeter and area. The students will use these formulas for each length and width they have recorded on their chart and compare the result with the answer they found when counting the sticks and tiles.

Evaluation: The students will create their "dream home" with a pool and garden. They will draw a floor plan of their home on graph paper. They must have at least 5 rooms, a pool, and a garden. They may have whatever rooms they want, but all of the rooms must be rectangular. They must find the perimeter and area of each room, the entire house, the pool and the garden. They will record in a "Construction Log" the length and width of each room as well as the number sentences showing the perimeter and area. This ensures that they are able to correctly use the formulas. If all of their answers are correct they get to join the math "neighborhood" and glue their floor plan to the long piece of butcher paper.

Gear Up: If the concept is too easy for the students, the teacher will give students shapes in which two rectangles are combined. The student will have to divide the figures into the two rectangles and find the area of one and add it to the area of the other. They must find the perimeter of the shape as well.

Gear Down: If the concept is too advanced for the students, the teacher will focus on the perimeter, and move on to the area in a separate lesson.

Katie Atkins
4th Grade Level
Lesson Plan – Capacity

Real Life Application: Finding capacity at the aquarium.

Indiana Standards Reference: Standard 5, Measurement: *Students understand perimeter and area, as well as measuring volume, capacity, time, and money.*

4.5.8 Use volume and capacity as different ways of measuring the space inside a shape.

Objectives: The students will determine capacity of a container.

Entry Behavior:
3.5.5 Estimate or find the volumes of objects by counting the number of cubes that would fill them.
3.5.6 Estimate and measure capacity using quarts, gallons, and liters.

Materials List: construction paper, markers, glue, sequins, glitter, string and tape, blue streamers, 1,3,5,10 gallon fish tanks, gallon jugs, water, index cards, prediction chart

Engagement: The students will make fish out of construction paper, markers, glue, sequins, glitter…etc. The teacher will hang these fish from the ceiling using string and tape. The teacher will also hang blue streamers from the ceiling transforming the room into an "aquarium." What kind of things do you see at the aquarium? What do the fish live in?

Exploration: Today we have our own aquarium that we will put our classroom fish in. The teacher will have a small 5 gallon aquarium set up in the front of the room. What important thing do fish need to live? Water! We need to fill our tank with water, but how much water do you think this tank can hold? The teacher will have the students write their predictions on the left side of an index card so that they can compare their prediction with the actual amount after the tank is full. The word that we use when we are describing the amount a container can hold is capacity. What are some different measures of capacity? They are cups, pints, quarts, gallons, milliliters, and liters. We are going to measure our aquarium using gallons. What is one way we can know FOR SURE how much this aquarium holds? We can pour gallons of water into the aquarium until it is full and count how many it took to fill up the aquarium. This is what the class is going to do to find the capacity of the tank. The teacher will have students assist in filling up a gallon jug of water. She will also have students assist in pouring the jug into the fish tank. They will fill the jug up five times and the tank will be full. The teacher will have the students write the result on the right side of their index card. The teacher will place a few fish in the tank to become classroom pets.

Explanation: The teacher will have the students write the result on the right side of their index card. Was your prediction correct? Which number was greater, your prediction or the actual capacity? Circle the greater number. Could we measure the capacity using something other than gallons? Using quarts or pints. How can we figure out how many quarts the fish tank holds without actually pouring water in, now that we know it holds five gallons? We can convert gallons to quarts. How many quarts are in a gallon? 4. How do we convert from gallons to quarts? Multiply by 4. How many quarts does the fish tank hold? 20. Can we use this same process to figure out how many pints the fish tank holds? Yes. The students will work with their neighbor to figure out how many pints are in the fish tank, and the teacher will have a few pairs share with the class.

Evaluation: The teacher will have the students create a classroom aquarium. She will have different stations with different sized fish tanks.

Station 1: Fishbowl
Station 2: 3-gallon tank
Station 3: 5-gallon tank
Station 4: 10-gallon tank

The students will work in small groups and travel from one station to the next. They will have a chart that asks for the prediction on the left, and the actual capacity in the middle column. The right column will be where they record how many quarts each tank holds. They will have to convert the units from gallons to quarts. At each station they will write down their prediction in the left column. With assistance from the teacher they will use the gallon jugs to pour water into the tanks. (The teacher will already have some of the jugs filled ahead of time.) The students will record the actual amount in the middle column of their chart. Then they will convert this number of gallons into quarts. They will move on until they have completed all four stations.

Gear Up: If the concept is too easy for the students, the teacher will also have the students find the volume of each container (rectangular prism) using the volume formula length x width x height= volume.

Gear Down: If the concept is too advanced for the students, the students will not convert the units to quarts but will only find the actual capacity of each container.

Katie Atkins
4th Grade Level
Lesson Plan – Elapsed Time

Real Life Application: Calculating the amount of elapsed time through a traveling theme.

Indiana Standards Reference: Standard 5, Measurement: *Students understand perimeter and area, as well as measuring volume, capacity, time, and money.*

4.5.9 Add time intervals involving hours and minutes.

Objectives: The students will calculate elapsed time using a t-chart.

The students will show the addition of two or more times on paper.

Entry Behavior:
3.5.9 Tell time to the nearest minute and find how much time has elapsed.

Materials List: t-charts, white boards, markers, Travel Guide

Engagement: The teacher will write the time on the board. The class is going to go on a walk (1 lap around the school). Before the walk, the class is going to predict how long the walk will take. What might determine how much time the trip will take? What may help or hinder the amount of time the trip will take. The class will go on the walk. When they return they will write the time on the board.

Exploration: What are some of the characteristics of a clock? One important thing about a clock is that it is marked at every five minutes. How might this information be helpful when learning about elapsed time, or time that has passed? You can count by fives to figure out the number of minutes that have passed. This will be quicker than counting by ones. The teacher will hand out the t-chart worksheet. The worksheet will contain t-charts that are labeled with the time started and the time ended on the left and the minutes that pass on the right. The concept of elapsed time can be hard, so the t-chart is helpful with students who need organization and a visual reference. The teacher will model an example of how the students will fill out the chart. For example: The truck driver left the factory at 1:15 PM and stopped at the truck stop at 2:30 PM. How much time passed before the truck driver stopped? The students will write the time started and ended beside the "Time." Underneath that they will list time intervals by 5 minutes. On the right they will record the minutes elapsed from the time in the row before. This will go by fives. Once they reach 60 they will circle is and write 1 hour. Then they will start counting over by fives. Below is an example.

Time (1:15 PM to 2:30 PM)	Minutes
1:20	5
1:25	10
1:30	15
1:35	20
1:40	25
1:45	30
1:50	35
1:55	40
2:00	45
2:05	50
2:10	55
2:15	60- 1 hour
2:20	5
2:25	10
2:30	15

The answer is 1 hour and 15 minutes, and this can clearly be seen on the chart. If you leave Florida at 6:00 AM and stopped to get gas at 9:30 AM, how much time passed before you stopped to get gas? The students will find the answer using the t-chart. If the plane left the airport at 5:50 PM and arrived at its destination at 7:20 PM, how long was the flight? The students will find the answer using the t-chart. Why might you want to know how long a trip will take before taking it? What are some ways you could make a good estimation of the time a trip will take?

Another important thing you need to know about time, is how to add minutes and hours together. For example, if you are having a birthday party for your friend at 6:00 PM, and it takes you 5 minutes to drive to the store to pick up the balloons, 10 minutes to drive to the bakery to pick up the cake, and then 30 minutes to drive to the party, how long will it take for you to get to the party from your house? This problem is simple addition problem. 5 minutes + 10 minutes + 30 minutes= 45 minutes. Sometimes the time may be over 60 minutes and you will need to rename it in hours. For example if you also had to go pick your friend up at his house, and that took you another 20 minutes, how long would it take for you to get to the party? 45 minutes + 20 minutes= 65 minutes, but 60 minutes equals 1 hour so if we subtract 65-60= 5 we get the answer 1 hour and 5 minutes. The teacher will ask the students to demonstrate the addition problems on their white boards. They will work similar examples. You walk 15 minutes home from school. When you have arrived, you realize you left your key in your locker. Instead of going back to school, you walk 10 minutes to your grandma's house, borrow a key, and then walk 10 minutes back? How many minutes did you walk?

Explanation: The students will share their t-charts with their neighbor. They will compare their charts to see if they have the same answers. If an answer is wrong, they will discuss how they might find the right answer. The teacher will assist as well. They

will share their addition problems on their white boards, and students will come up to show how they solved the addition problems. They will have to explain how they found the answer.

Evaluation: The teacher will give the students a pre-made "Travel Guide." In the guide, there will be different destinations. There will be a start time and an end time. They will have to find the time elapsed using a t-chart for different locations. Also in the guide, will be an approximation for the amount of minutes driving, and stops made. They will have to find the number of minutes it took according to approximation. They will compare the difference between the time they calculated on the t-chart and the time calculated in the approximation. Which answer do you think is more accurate? Why?

Gear Up: If the concept is too easy for the students, the students will look at time intervals that do not go by fives, such as 1:15 PM to 4:23 PM, or 7:33 AM to 9:01 AM. For the addition of minutes, the students will add what time they should leave in order to arrive at the destination on time.

Gear Down: If the concept is too advanced for the students, the students will only look at elapsed time up to an hour. The students will also only add together times that are less than 60 minutes.

Katie Atkins
4th Grade Level
Lesson Plan – Making change

Real Life Application: Making change when eating at a restaurant.

Indiana Standards Reference: Standard 5, Measurement: *Students understand perimeter and area, as well as measuring volume, capacity, time, and money.*

4.5.10 Determine the amount of change from a purchase.

Objectives: The students will determine the amount of change a customer receives when making a purchase and paying with a given amount of money.

Entry Behavior:
3.5.10 Find the value of any collection of coins and bills. Write amounts less than a dollar using the ¢ symbol and write larger amounts in decimal notation using the $ symbol.
3.5.11 Use play or real money to decide whether there is enough money to make a purchase.

Materials List: tablecloths, menus, plates, napkins, silverware, restaurant tickets, play money, paper, markers, crayons

Engagement: The teacher will set the room up like a restaurant. The students will be given $50.00 each. There will be tablecloths on the table and plates and napkins. The teacher will seat the students as the table acting as the hostess. She will hand each student a menu. (The menus can be donated from a local restaurant.)

Exploration: The students will sit down and look through the menu. The teacher will choose five students to act as waiters/waitresses. The waiters will write a ticket for each student's total purchase. The students will be required to purchase a drink, an entrée, and a dessert. The waiter will write down the prices of each item on the ticket and will bring the ticket to the teacher. The teacher will total the ticket and write the total next to the student's name on the clipboard. She will send the ticket back to the customer. The customer will then add the prices on the ticket. He/she will use their fifty dollars to pay for the meal. They will then calculate how much change they will receive back from the purchase. They will have to write down three different combinations of bills and coins that they could receive back as change. The waiters will take the money and give them proper change (the teacher will monitor). This activity will be repeated so that the students acting as waiters will also get to order and calculate the amount of change given back. If time permits, the activity can be repeated so that all students get the opportunity to be a waiter/waitress.

Explanation: The students will compare their calculations to the correct amount of change given by the waiter. If the amount is not the same, the students must rework the problems and find their mistake. If they are not able to do so, they may get assistance from another student or the teacher. The teacher will ask for three volunteers to share their orders and their work on the board or overhead. They will explain how they got the total and the amount of changed they received back. Students can compare their bills to the student examples shown.

Evaluation: The students will create their own menus, using the restaurant menus as a guide. They will have to include three drinks, three entrées, and three desserts. They will include prices of each item. No item can exceed $10.00. They will exchange menus with a partner. The partner will choose one drink, one entrée, and one dessert. They will find the total for all of the items. They have $35 to spend. They will find the amount of change they will receive. They will return the menus and repeat the process with two other partners (the second time they have $45.00 to spend, and the third time they will have $30.00 to spend). They will make a list of the paper money and coins needed to make amounts equivalent to the amount of change the student should receive. They must express the value using at least two different combinations of dollars and coins. They will end up with three different tickets. They will turn these tickets into the teacher to be checked.

Gear Up: If the concept is too easy for the students, they will be required to not only find the amount of change given back, but also compare the amounts. They will have to list the amounts from least to greatest and determine which meal is the most reasonably priced. They will also have to write a written explanation comparing the prices.

Gear Down: If the concept is too advanced for the students, they will not be required to add up all of the items. The teacher will do this and write the total on the bill. The students will focus solely on finding the amount of change they will receive back. They may also use the play money when trying to calculate the amount of change back as a concrete representation.

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